C. W. LEIHY

1926 Initiated as an Active Member by Zeta Chapter of the Sigma Tau Fraternity.

1926 Received Bachelor of Science degree in Electrical Engineering, Oregon State Collge, Corvallis, Oregon.

1934 Elected to National Council of Sigma Tau (four-year term).

1938 Re-elected to National Council of Sigma Tau (four-year term) (also held office from 1942 to 1948, since no Conclaves or elections were held during the war years).

1938-48 National Historian of Sigma Tau.

1948 Re-elected to National Council of Sigma Tau (two-year term).

1948-56 National President of Sigma Tau.

1950 Re-elected to National Council of Sigma Tau (four-year term).

1954 Re-elected to National Council of Sigma Tau (four-year term).

1958 Re-elected to National Council of Sigma Tau (six-year term).

Summer 1962

# The Pyramid of Sigma Tau

## THE HISTORY OF ENGINEERING AT KANSAS STATE UNIVERSITY

*(Adapted from an address by M. A. Durland, Dean of Engineer-) (ing and Architecture at Kansas State University and Director) (of the Kansas Engineering Experiment Station, before the April) (1961 Engineering Experiment Station luncheon in Manhattan,) (Kansas. )*

*(Dean Durland retired as Dean and Director on July 1, 1961, and) (became Dean Emeritus on the same date. He now teaches at) (Kansas State University in the capacity of Professor of Mechanical) (Engineering. )*

*(Dean Durland was initiated as an Active Member of Epsilon) (Chapter of the Sigma Tau Fraternity on October 3, 1916. He) (was the 74th member initiated by Epsilon Chapter after its in-) (stallation and the 610th member initiated into the Fraternity.)*

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Engineering is as old as history. The pyramids of Egypt were a pretty fair construction job — also the roads, aqueducts, and stadia of ancient Rome. There is a considerable amount of very high-class engineering described in the Bible. The highway job across the Red Sea was really something. There was, however, very little engineering progress for many centuries. The explanation is very simple — there were no engineering colleges.

Engineering education may be said to have begun almost exactly 200 years ago with the creation in France of the still famous Ecole des Ponts et Chausees. There was little development elsewhere in the next fifty years. In 1800, there was no school of applied science in the English speaking world. Germany possessed two small mining academies and a feeble school for surveyors. France had two successful schools for civilian engineers and two others for military engineers.

The next half century was however much different. France was still in the lead; but Germany was in the early stages of her great industrial advance with eight rapidly developing polytechnic schools, three mining academies, and numerous technical schools of lower rank. Great Britain was still making little progress in technical education, and only a single technical school had been in operation in the United States for any length of time.

The Rensselaer Polytechnic Institute at Troy, New York, founded in 1824, is generally recognized as the first engineering school in the United States. This honor is sometimes claimed by Norwich University and also by the U.S. Military Academy at West Point. The long-established universities, not only in the United States, but all over the world, were making it

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*Cover Picture:* **The west wing of Seaton Hall — the main engineering building at Kansas State University.**

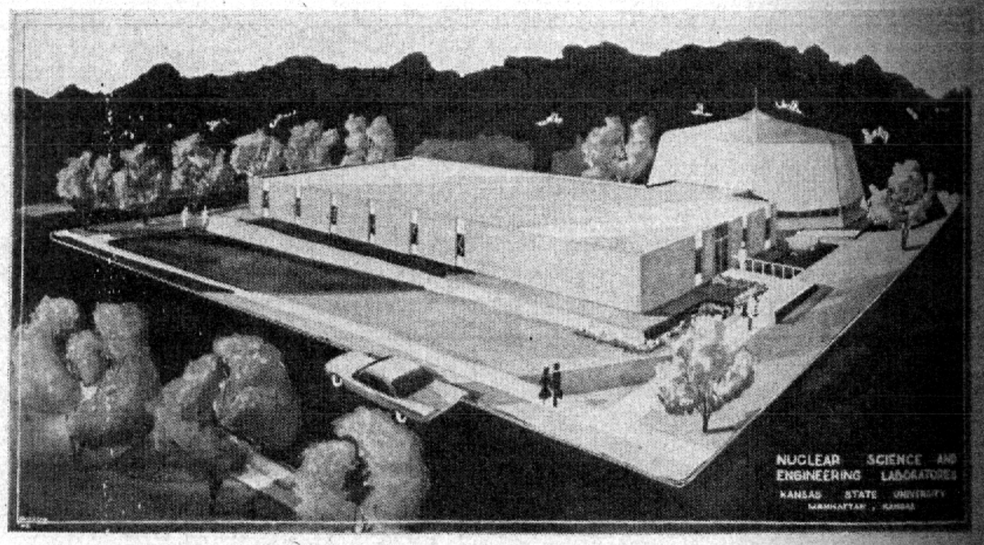
very difficult for technical education to get a foothold. Practical education, that is, teaching students to do something really useful, was not academically respectable. This is not too far from some of our current philosophy.

About 1850, several schools, including Harvard and Yale, took steps to create schools of applied science, but very little was accomplished.

The Morrill Land Grant Act of 1862 really marks the beginning of engineering education in the United States. In the space of a single decade, from 1862 to 1872, the number of engineering schools increased from six to seventy.

The provisions of the land-grant act passed by Congress on July 2, 1862 specified that colleges established in accordance with it should have as their object: "Without excluding other scientific and classical studies and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the respective states may prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life." So much for land-grant colleges. I will now devote my attention to this University.

The Kansas State Agricultural College was granted a charter in 1863 and, in accepting the conditions of the land-grant act, four departments—science and literature, mechanic arts, agriculture, and military science—were specified in the charter. As a matter of fact, only one, that of science and literature, was put into effect, and for the first 10 years of its existence, the college was really only one of the old classical type. It is true that in 1866 a position, professor of mechanics and civil engineering, was created and a curriculum (called, at that time, a "course") in mechanic arts and civil engineering was mentioned in the catalogue, but neither appears to have progressed beyond the paper stage. In 1869, Brevet Major-General J. W.




**Artist's concept of the Nuclear Engineering Building — Ward Hall — which has now been completed at Kansas State University. This building houses the TRIGA MARK II reactor and the Nuclear Science and Engineering Laboratories.**



Davidson, professor of military science and tactics and teacher of French and Spanish, was given the added title professor of civil engineering; and the following year J. S. Hougham, professor of agricultural chemistry and commercial science, was made also professor of mechanic arts. Quite obviously such positions, which were only added duties for already overworked teachers, could be of little service and they were soon discontinued.

The first serious intention toward any real mechanic arts is indicated in the catalogue for 1871 in the statement, "A small blacksmith shop and carpenter shop afford a beginning to the department of mechanics." Ambrose Todd was made superintendent of the shops and instructor in mechanics. This must have been somewhat of a promotion for Mr. Todd, since the year before he had occupied the position of janitor.

The acceptance by John A. Anderson, in 1873, of the presidency of the institution marks probably the first positive attempt to comply with the terms of the land-grant act. President Anderson's creed was expressed by himself as follows, "Instead of the aim of the college being the making of thoroughly educated men, its greater aim should be to make men thoroughly educated farmers, carpenters, masons, or blacksmiths." Even he was more interested in training mechanics than engineers. Anderson, a Junction City preacher, was more of a politician than an educator and Kansas State was very fortunate when President Anderson was elected to Congress.

The mechanic arts course was, however, discontinued in 1875 on account of lack of demand after having been in theoretical operation for several years, but in the same year the middle section of the present shop building was built. In addition to the wood shops, it housed the following departments: printing, telegraphy, sewing, and instrumental music. The blacksmith shop, consisting of two forges, was in a small building nearby. The total equipment of the mechanical department was listed as 25 sets of carpenter tools and some blacksmith tools.

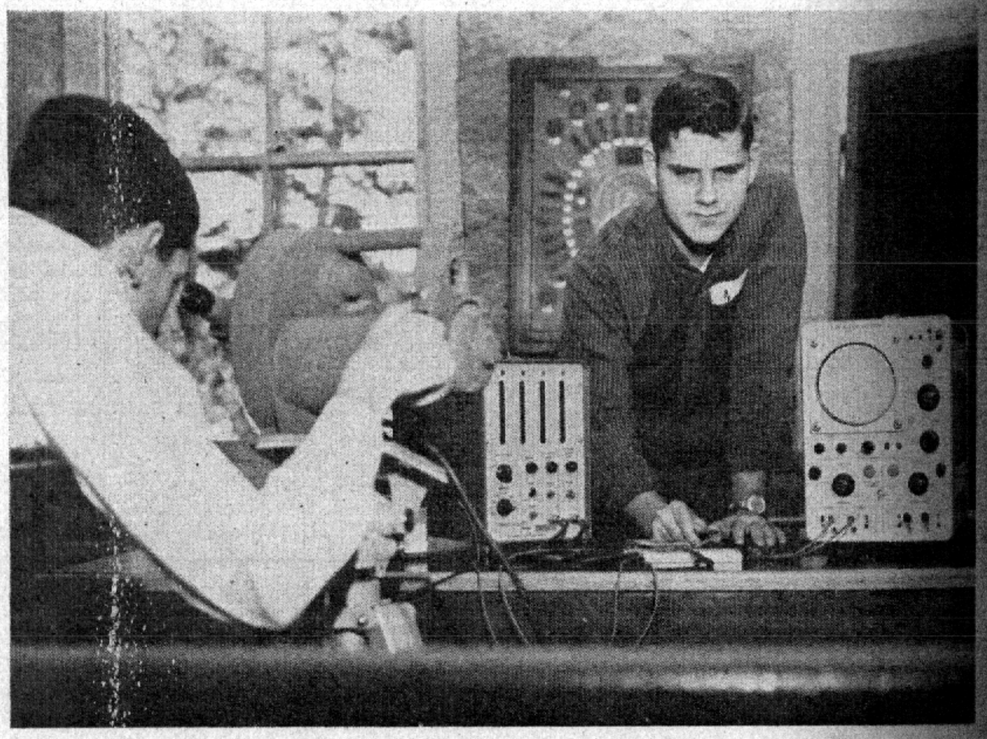
The appointment of O. P. Hood as superintendent of the workshops in 1886 was without question the most important event up to that time in the direction of engineering training at Kansas State Agricultural College. Professor Hood, a graduate of Rose Polytechnic Institute, was the first engineer to be given a place on the college faculty and he immediately initiated a program for making the mechanical department something more than a shop. He was made instructor in 1887 and, in 1889, professor of mechanics and engineering, in addition to being superintendent of the shops.

Although a curriculum in mechanic arts and civil engineering had been listed in the college catalogue of 1866-67, and another in mechanic arts several years later, neither had ever functioned, whether from lack of demand, lack of teaching personnel and equipment, or for other reasons is uncertain. Until the year 1896-97, only one course was in actual operation in the whole college which, with the limited substitutions allowed, was expected to fit its graduates for the profession of home economics, agriculture, engineering, or almost any other. However, in 1896, the fourth year of the course was divided into three options: farmers', women's, and mechanics'. Electives were also allowed in the mechanics' option so that architectural de-

sign could be taken by those wishing to become architects. Progress along engineering lines has been rapid since that time. In the faculty minutes of November 3, 1897, the following is recorded: "On the motion of Professor Willard, the name of the mechanics' course is changed to engineering course." Apparently Doctor Willard introduced, in name at least, engineering to Kansas State Agricultural College.

Although one of the requirements in the organization of the College was that it should offer work in the mechanic arts, which had been described by the author of the act to include engineering, it had quite obviously neglected this branch. This is shown very strikingly in a statement of occupations of graduates up to the year 1897. Although the College had never even claimed to offer work in law, 30 of its graduates were lawyers or students of law, while only 6 were listed as engineers.

In 1898-99, a four-year course in mechanical engineering was described and one in electrical engineering mentioned. From then on other curricula have been added as the need appeared — architecture in 1904, civil engineering in 1907 (and also printing, which was discontinued in 1912), agricultural engineering in 1913, flour-mill engineering in 1916 (discontinued 1933), chemical engineering in 1924 (and landscape architecture which was discontinued in 1937), architectural engineering in 1924, industrial arts in 1937 (discontinued in 1958), industrial engineering in 1954, industrial



**Mechanical engineering students at Kansas State University take a last look at a mouse trap before springing it and photographing the action. They are doing measurement studies with the aid of a counter, motion picture camera, and oscilloscope. "If you build a better mouse trap, . . ."**



technology in 1955 (discontinued in 1960), and nuclear engineering in 1953. In 1897, several programs were set up for training apprentices. These were discontinued in 1905. Beginning in 1914 and terminating in 1930, various short courses of sub-collegiate caliber were offered in such lines as blacksmithing, foundry work, machine shop practice, auto mechanics, and concrete construction.

As a gesture toward winning World War II, and under pressure from the Board of Regents, a 2-year program in Industrial Technology was set up in 1943. During the war various special programs were set up: ESWT (Engineering Science War Training) programs; ESMWT (Engineering, Science, Management War Training) programs; ASTP (Army Specialized Training Programs); and, later, ASTRP (Army Specialized Training Reserve Programs) in rapid succession, which were essentially "quickies" for engineers and technicians. The common characteristic of each army program was that if it was successful, it was promptly revised.

Other short courses along technical lines were begun in the early part of the post World War II period. The pressure of our regular collegiate engineering programs quickly made it necessary to drop all such short course programs.

The professional work of the whole college was extended very rapidly in the early part of the twentieth century so that it became necessary from the administrative point of view to group the various departments into larger groups called divisions. The division of mechanic arts was organized in 1909 and included these departments: applied mechanics and hydraulics, architecture and drawing, civil engineering, electrical engineering, mechanical drawing and machine design, power and experimental engineering, printing, shop methods and practice, and steam and gas engineering. Prior to that time the work of the division had been chiefly organized under E. B. McCormick, professor of mechanical engineering and superintendent of the shops; Dr. J. D. Walters, professor of architecture and drawing; and Prof. B. F. Eyer, professor of physics and electrical engineering. The remainder of the engineering faculty in 1908 were A. A. Potter, assistant professor of mechanical engineering (later dean); Ella Weeks, instructor in drawing; R. A. Seaton, assistant in mechanical engineering (later dean); M. S. Brandt, assistant in architecture and drawing; four shop foremen with one assistant; and eleven student assistants.

In 1917, the name of the division was changed from mechanic arts to engineering to be more in line with common practice, and a General Engineering Department was created for the newly required courses Engineering Lectures and Seminar. In 1938, the word architecture was added to make it Division of Engineering and Architecture, and in 1946 the word Division was changed to School, but few major changes have been made either in organization or administration of the division in the past 50 years. In 1913, the department of power and experimental engineering was discontinued and its work taken over by the newly created department of applied mechanics and machine design and the steam and gas engineering department. Civil was changed to Civil and Highway Engineering (back to Civil in

1916), and Shop Methods and Practice was changed to Shop Practice (Shop Practice to Industrial Engineering and Industrial Arts in 1954, and to simply Industrial Engineering in 1960). In 1914, the department of agricultural engineering was created under the name farm machinery (the name agricultural engineering was not applied to the department until 1922). For several years previously there had been an associate professor of farm mechanics in the agronomy department, and in 1915 the department of printing was removed to the general science division and combined with industrial journalism. In 1917, Architecture and Drawing was changed to Architecture. In 1940, the department of chemical engineering was organized in the School of Engineering and Architecture. Prior to that date, its work had been carried on in the Chemistry Department in the School of Arts and Sciences. The departments of Heat and Power, Custodian, and Building and Repair were transferred from the Engineering School to Administration and renamed the Physical Plant Department in January 1949. In 1950, the name of the Department of Architecture, in recognition of its increasing work in the field of art, was changed to Architecture and Allied Arts. This trend is well evidenced by the fact that during the present semester 31 percent of the student credit hours taught in the Department are for students not enrolled in the School of Engineering and Architecture. In 1956, with the retirement of Professor C. E. Pearce as Head of the Machine Design Department, that department was discontinued and its staff transferred to the Mechanical Engineering Department. The Nuclear Engineering department, whose beginning was in Chemical Engineering, was created in 1958 and is the newest in the engineering school family.

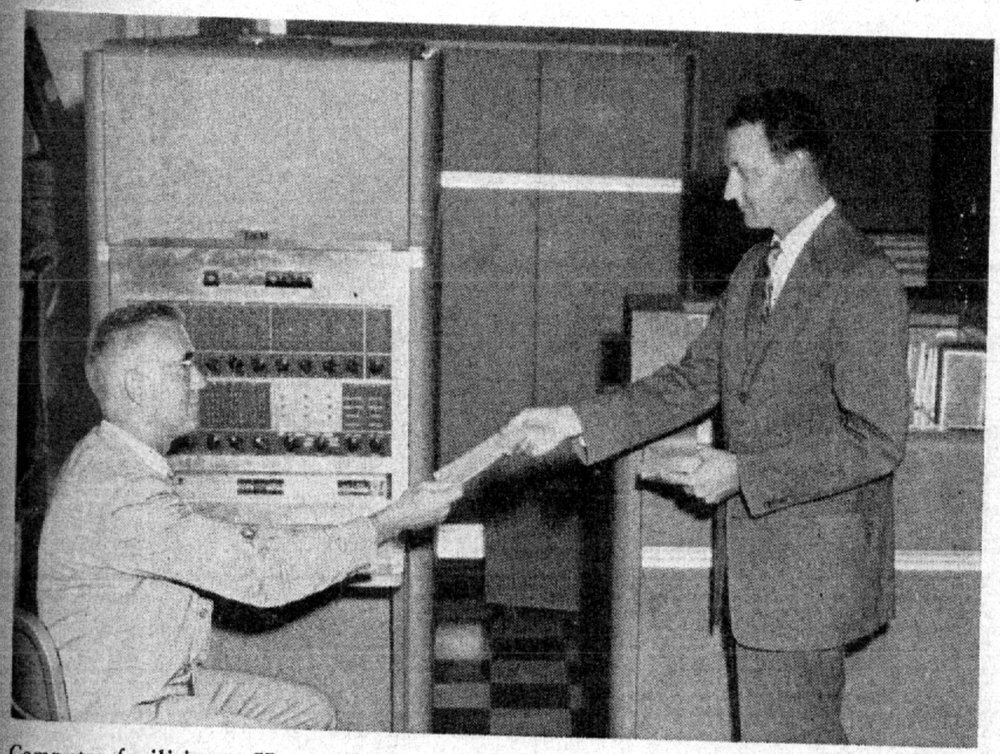
The present organization of the School of Engineering and Architecture consists of nine teaching departments — Agricultural Engineering, Prof. G. H. Larson the Head since 1956; Applied Mechanics, Professor M. E. Raville the Head since 1956; Architecture and Allied Arts, Professor Emil Fischer the Head since 1955; Chemical Engineering, Professor W. H. Honstead the Head since 1960; Civil Engineering, Professor R. F. Morse the Head since 1947; Electrical Engineering, Professor R. M. Kerchner the Head since 1955; Industrial Engineering, Professor I. L. Reis the Head since 1959; Mechanical Engineering, R. G. Nevins the Head since 1957; and Nuclear Engineering, Professor W. G. Kimel the Head since 1958.

As indicated earlier engineering education at Kansas State is only a little over sixty years old. By decades, in Engineering and Architecture, we have graduated from 1900 to 1910, 233; 1910 to 1920, 372; from 1920 to 1930, 863; 1930 to 1940, 1225, a total of only 2,698 in our first forty years, from 940 to 1950 we have graduated 1,754, and 1950 to 1960, inclusive 3,553. As of February 1961, engineering graduates number over 8,100. The increase in graduate work has been much more rapid. Although graduate programs have been offered in all departments for many years, only 187 masters degrees had been conferred up to 1950. From 1950 to date 286 masters degrees were conferred. The degree of Doctor of Philosophy has been offered in Applied Mechanics for several years but only 2 such degrees have been conferred. More recently the PhD program has been initiated in the departments of Electrical Engineering, Mechanical Engineering, and Chemical Engineering. At present, there are 32 students enrolled in these various PhD programs.



From June 1916 to August 1939, 147 professional degrees were conferred. These degrees required at least three years of engineering or architectural practice and a thesis. These degrees were discontinued in 1939 due to the feeling that professional engineering registration was accomplishing the same object. Some 10 to 12 honorary doctors degrees have also been awarded to engineering graduates.

The academic program for engineering at Kansas State has changed considerably in its fifty years of existence but parts of it are very much the same. In 1899, admission to all college curriculums (called "courses" at that time) required only a grade school education. The four-year engineering program included much more mathematics and English on that account. Agriculture was required as well as botany. Considerably more shop work and drawing were included. History, government, and economics were about equivalent to our present non-technical electives. The time devoted to mechanics and thermodynamics was about the same as now. The major difference between 1899 and 1961 is largely the inclusion of high school training. The immediate result of the increase in entrance requirements was the dropping of no longer needed courses in elementary mathematics and English. These hours, as well as some others such as botany and agriculture, were



Computer facilities at Kansas State University include an IBM 650, an IBM 1620, and an analogue computer designed by the Electrical Engineering Department. Shown is Dr. Tom Hamilton discussing the loading of a deck of IBM cards with Dr. S. T. Parker. The computer facilities are available to faculty, students, and staff.

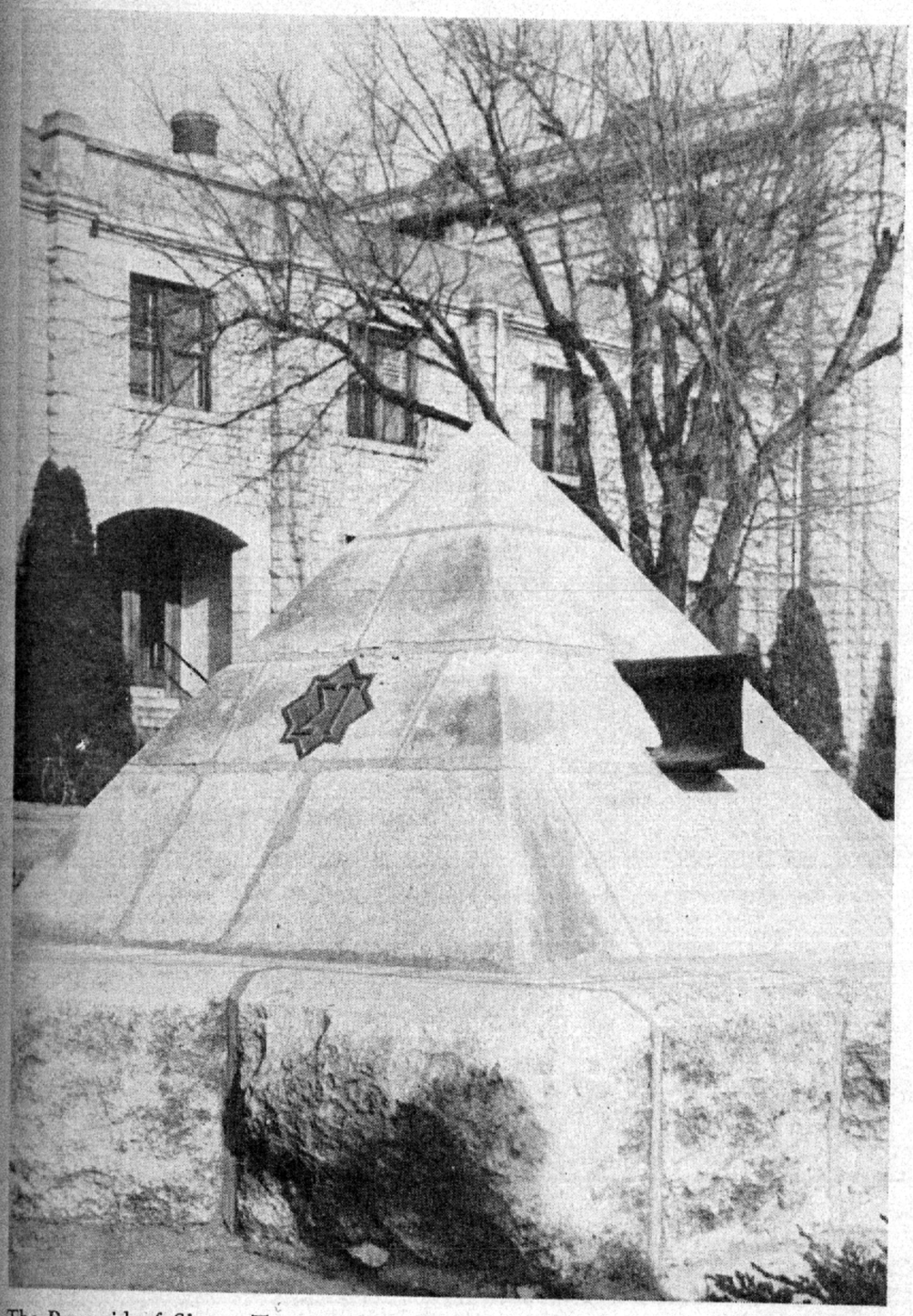
replaced by additional shop work, drawing, and advanced technical subjects. Recent reductions in drawing and shop work — and pushing formerly required freshman mathematics courses back to entrance requirements — afford additional hours to be about equally divided between technical and non-technical subjects.

Until recently engineering educators have been more critical of their work than anyone else. About 40 years ago, the Society for the Promotion of Engineering Education — whose membership, at that time, was composed almost entirely of engineering teachers — asked the major national engineering societies to appoint advisory committees on engineering education. The result was the employment of Dr. Charles R. Mann, a physicist on the staff of the University of Chicago, to make an investigation of engineering education. This was rather meagerly financed by the Carnegie Foundation for the Advancement of Teaching and resulted in the somewhat controversial Mann Report in 1918. Mann concluded that a good many things were wrong with engineering programs and the report stirred up considerable controversy. The major result was the undertaking, in 1923, of a much more comprehensive investigation of the same thing. This was adequately financed by the Carnegie Foundation, The General Electric Company, the Westinghouse Electric Corporation, and others. William E. Wickenden of the American Telephone and Telegraph Company was employed to direct it. Following numerous detailed and preliminary reports, the final report was made in 1929. This report concluded that engineering colleges were doing a very good piece of work, but were probably overworking (or trying to) the students, and were not allowing enough opportunities for electives. More recently there has been considerable pressure for the inclusion of even more work in the fields of social science and the humanities.

The four-year curriculum is, of course, too brief to include many things a student should learn; and, if we stay with this four-year program, we certainly must not eliminate the minimum amount of technical work required for beginning professional competence. Without opening a discussion of the relative merits of a four and a five-year program, it should be stated only that as yet the four-year program seems to be the more desirable.

It is frequently indicated that many people in Kansas (and even some in Manhattan) considerably underrate the School of Engineering at Kansas State University. Graduates, however, soon find out that they need not worry in competition with graduates from any engineering school. Typical alumni reactions are quite commonly that expressed in a letter of April 8, 1961. In writing to the Electrical Engineering Department to bring his address up to date, the alumnus closed his letter with this statement "Having worked with graduates of several leading engineering schools such as M. I. T., California Institute of Technology, Purdue, Illinois, and others, through comparison, I am convinced that the engineering education at Kansas State is of the highest caliber." This graduate was not one of our better students. Probably the faculty is the most important factor in any school. Ours at Kansas State University will look well in any comparison. Whether you judge a faculty by academic training, by textbooks written, by research carried on, by the graduates, by committee appointments and offices in national





The Pyramid of Sigma Tau at Kansas State University, with the main engineering building, Seaton Hall, in the background. Professor John R. Fagan, Chapter Advisor of Epsilon Chapter of Sigma Tau, states: "The pyramid symbolizes stability and the rail section progress. This is something that our country, our universities, engineering, and Sigma Tau have stood for, and something that we hope they will continue to represent."

and local professional societies, or by special honors and achievements, the Kansas State University engineering faculty will look well. Time does not permit a listing of faculty accomplishments.

Next to faculty, equipment is most important. There are admittedly many items of laboratory equipment which we do not have that we should. However, we will compare well with other good schools and are making steady improvement. Our television station was the first college station in the United States. Color television was first produced and first received in Kansas by equipment built and operated by faculty and students at Kansas State. The first telephone exhibited in Kansas was the property of Professor William K. Kedzie. It was constructed by the Mechanical Department after his directions. In the summer of 1877 the professor gave "illustrated" lectures on the telephone in a large number of Kansas towns. Supt. W. C. Stewart of the telegraph department, accompanied him as manipulator, and Prof. J. D. Walters, teacher of drawing, furnished cornet solos over the telegraph wires from the telegraph class room in the Mechanical building.

A top-flight educational program, particularly at the graduate level, must be accompanied by a top-flight research program. Our research program came into being on March 24, 1910 by the following action of the Board of Regents. "The recommendation of Dean E. B. McCormick in relation to the organization of an engineering experiment station was presented and discussed at length. It was ordered on motion of Regent Capper: (1) That the Board of Regents authorize the establishment of an engineering experiment station in accordance with the plans submitted by Dean E. B. McCormick. (2) That the staff be composed of the heads of the departments of the engineering department, including the heads of the new departments created by the order of the Board at this meeting. (3) It was ordered that the Dean of the Engineering Department be designated as Director of the Experiment Station."

Anyone who has tried to develop research programs recognizes readily that it is very likely to be a slow and discouraging endeavor. Only limited funds were available and government sponsored research has only recently been invented. If I started in on our research program this would be much too long.

In conclusion, I will simply add that our research program has developed rapidly since World War II and has every indication of continuing progress.

Our off-campus service continues to increase as evidenced by the establishment in 1959 of the Division of Engineering and Industrial Services, in the Engineering Experiment Station, and the creation, in January of 1961, of a Center for Community Planning Services in that Division.

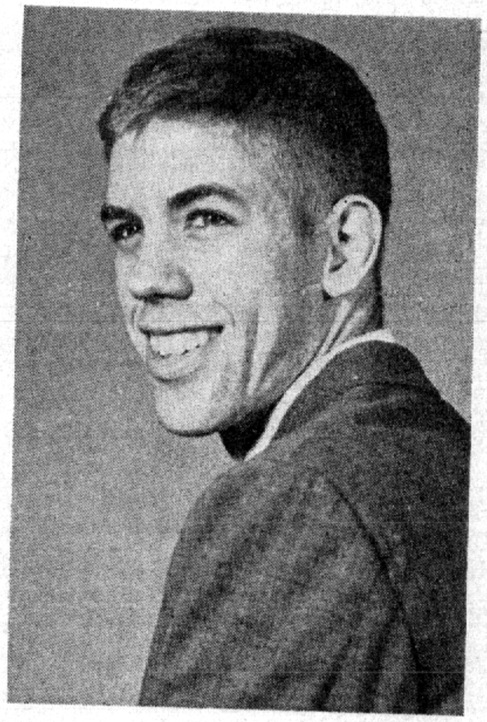
SIGMA TAU

"Individual freedom is our most precious possession. It is to be guarded as the chief heritage of our people, the wellspring of our spiritual and material greatness, and the central target of all enemies — internal and external — who seek to weaken or destroy the American Republic." — *Dwight D. Eisenhower.*



## SIGMA TAU FELLOWSHIP FOR 1962 AWARDED TO MEMBER OF ALPHA IOTA CHAPTER

Richard J. Christopher (Alpha Iota Chapter) has been designated by the Sigma Tau Fellowship Award Committee as the recipient of the 1962 Fellowship granted by the Sigma Tau Foundation, Inc. He received the Bachelor of Science degree in Civil Engineering in June 1962 from Bradley University, graduating with Honors. Mr. Christopher's fine scholastic record ranks him at the very top among engineering students and he is indeed to be congratulated by all members of the Sigma Tau Fraternity on receiving the Fellowship for the 1962-63 school year.



From his record, it is noted that scholarships are not necessarily a new thing to Christopher. During his sophomore year, he was awarded an Honor Scholarship by Bradley University, and in both his junior and senior years he was the recipient of Scholarships granted by Texaco Inc.

Taking an active interest in campus organizations and activities, Christopher was a member of the Civil Engineering Club and the Arnold Air Society. He also was elected to membership in Phi Eta Sigma and Pi Beta Tau, serving the latter organization as Corresponding Secretary and Vice-President in his junior and senior years respectively. He was initiated as a member of the Alpha Iota Chapter of the Sigma Tau Fraternity on May 23, 1961, and served as the chapter's Recording Secretary in his senior year.

Married and the father of one child, Christopher supplemented his income by working as an architectural draftsman during the school years and in the summers. Of this activity, one faculty member stated as follows: "His undergraduate work has been extremely exceptional. He has been the highest ranking student in the entire University during his four years of study. This ranking in itself is commendable, but even more noteworthy are the conditions under which he has worked. During his undergraduate study he has been obligated to work full time with an engineering firm in the city to support his wife and child. This action demonstrates his willingness to accept responsibility."

Other faculty comments concerning the high capabilities of Christopher included "an exceptional student, having the unique distinction of being the top male student in the University" — "has actively participated in student organizations of which he is a member" — "demonstrated exceptional